

The scale is unusually dark and strongly chitinated. There is a punctured band running anteriorly from the anal plates in the middle line.

Antennae 8-jointed. Below I give measurements of the antennae of the present insect, and also of 6- and 7-jointed *E. prunastri*, from slides prepared by Mr. Pergande.

Joints:	(1.)	(2.)	(3.)	(4.)	(5.)	(6.)	(7.)	(8.)
	?	33.	42.	24.	36.	21.	18.	33.
	?	45.	45.	60.	17.	21.	34.	—
	?	30.	90.	17.	21.	34.	—	—

## BUTTON-BUSH INSECTS.

BY JAMES G. NEEDHAM, LAKE FOREST, ILL.

Entomologists who collect from flowers know how many insects gather about the heads of the button-bush — the "honeyballs" of popular nomenclature. These heads are conspicuously white, their fragrance is very marked, their nectar is abundant, often filling the corollas so full that short-tongued insects may sip from them, and the protandrous stamens heap their pollen upon the style knob, which then protrudes conveniently for the benefit of pollen feeders. By carefully watching these flowers through their season, one may obtain nearly all the flower-visiting insects of his neighborhood.

My own too brief season of butterfly collecting was spent at Piasa Bluffs on the Mississippi, where there were a few button-bush clumps along the river banks under the edge of the bluffs; and there the butterflies swarmed — all the butterflies of that vicinity. They made a picture there which I shall always remember with delight. Dozens of them in a bright hued throng, poising on the swaying heads, or hovering over the dark green clumps that were set at the outer edge of a thin fringe of vegetation that stretched between the gray cliffs above the shining river below.

The predominant visitors are butterflies, but this predominance is unduly apparent because these are so conspicuous. Robertson (Bot. gaz., vol. 16, 65-66) lists 60 species of insects as visitors to the button-bush flowers. Of these 26 are butterflies and 20 are bees.

I spent the summer of 1899 in Lake Forest; and there, under favorable conditions, began a study of the insects affecting the button-bush — not the transient visitors of the flowering season, but the resident insects that enter more closely into ecological relations with it. I found some 30 species of these, and made some observations on the habits of many of them. I planned to continue my observa-

tions, but other matters came into my hands demanding all my time, and no further opportunity being now in prospect, I have concluded to publish such facts as are already gathered.

I studied the button-bush in a shallow open pond on the country place of Mr. R. M. Bissell, within easy walking distance of my home, and in a "pot-hole" in the woods near by. The pot-hole was filled almost exclusively with a dense and tall growth of these shrubs. In the pond the clumps were scattered, low and broad in form, and were restricted to the borders of a flat island that lay in the midst of it. This pond is of several acres extent, and is hardly too deep for wading with hip boots anywhere. But it is being filled, by the land building of the button-bush around the borders of the island, and by that of the tussock sedges that fringe all its outer borders. Each summer it is reduced by evaporation to a few little pools, at which time the button-bush clumps stand upon a black soil that is fissured with deep sun-cracks. On the island, clumps of glaucous willow and red dogwood crowd the button-bush clumps in the rear, and they are generally flanked by some or all of the following weaker plants: *Calamagrostis canadensis*, *Panicularia fluitans*, *Carex utriculata*, *Dulichium spathaceum*, *Sparganium eurycarpum*, *Sagittaria variabilis*.

The clumps here are impenetrable thickets. Muskrats build their huge hummocks under them, immensely furthering the land-building process: tree frogs climb the gray trunks, and red wing blackbirds build their nests in the tangled branches. The density of their growth excludes other large plants, but an interesting group of weaklings nestle in their shadows: *Viola blanda*, *Scutellaria galericulata*, *Galium trifidum*, and *Oenoclea sensibilis*. At the surface of the water the trunks are closely enwrapped by a moss of the genus *Amblystegium*.

The button-bush is our only woody representative of the madder family. Coffee is akin to it, and most of its relatives are tropical shrubs. It is not well adapted in some respects to our latitude. It develops only unprotected buds, that are killed each winter together with the terminal shoots, the new growth from adventitious buds in spring being late in appearing. One result of this, with a bearing on the insect life found associated with it, is that the shoots of one season are lateral to those of the preceding season, and the growth is scragged, and there are many dead tops, broken ends, and exposed pith cavities.

Very few insects have been recorded from the button-bush hitherto, aside from the flower visitors. Dr. Packard in the 5th report of the U. S. entomological commission mentions three, two of these notes being citations of earlier records by Harris and Riley. These are:—

1. *Platysamia cecropia* (Linné), p. 402.
2. *Callosamia promethea* (Drury), p. 525.
3. *Hyphantria cunea* (Drury), p. 249.

These are all general feeders on foliage of woody plants. An undetermined tineid from *Cephalanthus* is mentioned in Insect life, vol. 3, p. 18. These and Robertson's list of visitors to the flowers, are the only records I have found. When beginning my study I wrote Dr. L. O. Howard, asking him whether the records of the Division of entomology of the Department of agriculture included other species, and he kindly sent me the following list:—

1. *Harrisimemna trisignata* (Walk.).
2. *Laverna cephalanthiella* Chamb.
3. *Aphis cephalanthi* Thomas.
4. An undetermined cecidomyiid.

In my own studies I have come upon only the first of Dr. Packard's list and the third of Dr. Howard's. I will now give my own list, omitting all flower visitors except such as are not included in Robertson's list, arranging them by orders first with notes and observations, and concluding with a summary list according to habits.

LEPIDOPTERA. 1. *Melanomma auricinctarium* Grote. Pupae of this species may be found singly in pith cavities excavated in the broken ends of dead stems about half an inch in diameter, during the entire winter and early spring. They are found also in cavities excavated in the bark of the thickest of the fallen stems, generally a number near together, where conditions are favorable. The cavities in the bark are short and tortuous, and are directed toward the surface at the end and cut almost, but not quite through, by the larvae before pupating. The pith cavities in standing stems have the appearance of excavations of the wasp *DAHLBOHMIA*, (No. 7 *post*). Although this is perhaps the most abundant of the Lepidoptera found on the button-bush, larvae were not observed. A good many heads of fruit were found still hanging in winter, with holes bored through them transversely to the seeds; I did not find the borers. I thought they might perhaps be the larvae of this species, but found no proof. From pupae collected for breeding, imagos emerged in May. They were determined by Prof. C. H. Fernald.

2. *Acronycta oblongata* (Smith & Abbot). This is a common leaf feeder. Its larvae when newly hatched are ramblers, feeding here a little and there a little, but when they are older they feed at the tips of the flowering shoots. They begin at the top, eating the leaves off down to stubs of the petiole, thus consuming generally two, sometimes three or four pairs of the opposite leaves, and then removing to another shoot. When not feeding they are often to be found resting in seclusion on the gray bark of the preceding year's growth. They are very frequently parasitized, especially by the big red *Rhogas rileyi* (No. 8 *post*); and the parasitized individuals settle upon the stems, first overspreading them with a thick mat of silk, attach their feet, and then at their death there exudes in the thoracic region a

brownish fluid which hardens and glues the old skin to the silk. RHOGAS emerges through a big round hole cut in the back of the larva, but the empty larval skin may hang through several seasons, until bleached and weathered and bare. I have found a number of them in early spring still attached, and well preserved.

I bred many parasites from the larvae of this species, but only one moth; that one emerged on the 20th of July from a cocoon that was spun by the larva in the top of a SCIRPUS stem, within a nest made of deflexed bracts and flowering branches fastened with silk to the side of the stem. That specimen and specimens of the three next following species have been determined by Prof. John B. Smith.

3. *Eudryas grata* (Fabr.). A single pupa of this species was found in spring under the bark of a fallen button-bush stem, in a well-formed pupal cell, and was bred indoors, the handsome moth emerging in May.

4. *Agrotis ypsilon* Rott. } A number of moths of these two species were  
5. *Plusia simplex* Guen. } seen visiting the button-bush flowers for nectar at dusk.

6. *Platysamia cecropia* (Linné). A single egg cluster of this species was found on a button-bush leaf, and the larvae were hatched at home on July 2d. Four small larvae were found in another place on a single leaf a few days thereafter.

HYMENOPTERA. 7. *Dahlbohemia needhami* Ashmead. This species shares the terminal pith cavities with MELANOMMA (No. 1 *ante*), but is much less common. The first specimens were found in winter, hibernating in their cells as pupae. Imagoes were bred from these in May. On June 26th I first saw the live wasp. It was a female, busily engaged in excavating the pith in the end of a broken stem. She would descend into the stem and after a few seconds back up to the surface and scatter some fine white pith chips, descend again instantly, and repeat. I marked the place and returned the next day to find her storing her completed nest tunnel with aphids — nymphs of RHOPALOSIPHUM sp? and CHAITOPHORUS sp? I captured her then, and examined the nest, and found one cell completed and closed, and a second one half stored.

The completed nest consists of four or five cells arranged end to end in the cavity, separated by partitions of fine pith chips, the thickness of the partition being about equal to the diameter of the cell. It appears that the first boring into the pith cavity is not of the full diameter of the cells, and that the chips made in finishing the walls of each cell, except the bottom one, are used to form the partition separating it from the one below it.

This species and the three named Hymenoptera next following have been determined by Dr. Wm. H. Ashmead.

8. *Rhogas rileyi* Cress. This big parasite of *Acronycta oblonga* has already

been mentioned under the account of that species. It is sufficiently common to serve as an efficient check upon the depredations of the larvae of that species. The larvae are generally killed before they are grown. My bred specimens of the parasite are labeled the 18th and the 21st of June.

9. An undescribed pteromalid, in the hands of Mr. Ashmead for description. Bred from larvae of *Acronycta obliqua* on the 5th of June.

10. An undescribed pteromalid, in the hands of Mr. Ashmead for description. Bred from pupae of *Dahlbohnia needhami* about the first of May.

11. *Coccophagus flavoscutellum* Ashmead. Bred on the 5th and 6th of June in great numbers from the male scales of *Eulecanium armeniacum* (No. 16 *post*), which they completely annihilated.

12. *Chalcis annulata* Fabr. Found on button-bush stems, but not further observed.

13. *Siobla excava* Norton. A pair of sawflies of this species was captured in July on a well isolated clump of button-bush. A number of sawfly larvae were taken feeding on the same clump on the 27th of June, some of them apparently grown. These larvae fed only on the young and tender leaves of the sterile shoots. They were hardly gregarious, and in their feeding, they ate but a few small holes in each leaf. Mr. A. D. MacGillivray determined the adults, and I have supposed that the larva belong to the same species.

HEMIPTERA. 14. *Neurocolpus nubilus* Say. This species and the two next following were the only ones that appeared to be getting their living exclusively at the expense of the button-bush (*Acronycta obliqua* fed also on the leaves of the tall dock, *Rumex altissimus*, on the island). This rather prettily red-marked capsid was seen feeding about the buds of the flowering shoots, nymphs only being present in May, and adults appearing about the middle of June. Determined by Mr. O. Heidemann.

15. *Aphis cephalanthi* Thos. A few colonies of this aphid were found on flowering shoots that overhung the water. Their bluish powdery covering gave to the shoots which they thickly covered a decidedly glaucous appearance. In the colonies were found foraging the larvae of the anthomyid (No. 22) and the coccinellid (No. 31) mentioned below.

16. *Eulecanium armeniacum* Craw. This scale was very common during the winter of 1898-99 on shoots of the preceding season; but it was excessively parasitized with *Coccophagus flavoscutellum*, and I have not been able to find a specimen since that season. I placed hundreds of the male scales in a proper breeding cage in April, and hundreds of the parasites emerged, but not a single male scale insect.

- |  |   |
|--|---|
| 17. <i>Archasia galeata</i> (Fabr.).       | } These species were all found upon the leaves and, presumably, feeding there. Determined by Mr. O. Heide-<br>mann. |
| 18. <i>Alymna inornata</i> (Say).          |   |
| 19. <i>Alymna querci</i> (Fitch).          |   |
| 20. <i>Phlepsius irroratus</i> (Say).      |   |
| 21. <i>Thamnotettix clivellaria</i> (Say). |   |

DIPTERA. 22. *Leucopsis nigricornis* Egger. The larvae of this little fly were found June 27th in the midst of colonies of *Aphis cephalanthi*, feeding voraciously on the plant lice. Though legless they could adhere to the convex surface of a bare stem or crawl about upon it. The living larvae are whitish, with a covering of bluish powder similar to that of the aphids, and there are on the middle of the back several darker M-marks, connected in the middle by an interrupted middorsal line. Some larvae were observed pupating in the midst of the aphid colony, attaching the puparium to the stem. The puparium is at first yellowish, but later it turns reddish brown. From puparia collected here a number of imagoes were bred, and these and the following Diptera have been determined by Mr. D. W. Coquillett.

23. *Epiphragma fuscipennis* Say. Larvae of this species are very common under the bark and in the sap wood of watersoaked button-bush stems that lie upon the mud. They are able to burrow through rather solid wood. Larvae of different sizes may be obtained almost any time. Transformation takes place mostly between the middle of May and the middle of June. A full account of this species with figures will appear in my forthcoming second report from the N. Y. entomological field station.

24. *Odontomyia vertebrata* Say. Observed on the flowers; specimens now at hand bear the dates June 2 and 27. The larvae and pupae are taken not uncommonly floating on the surface of the pond.

- |   |  |
|---|--|
| 25. <i>Eristalis transversus</i> Wied. 25th June. | } All found feeding from the flowers, the first very commonly, the last two rather rarely. |
| 26. <i>Eristalis bastardi</i> Macq. 21st June.    |  |
| 27. <i>Helophilus laetus</i> Loew 21st June.      |  |
| 28. <i>Tropidia albistylum</i> Macq. 21st June.   |  |
| 29. <i>Baccha fuscipennis</i> Say 31st July.      |  |
| 30. <i>Chrysogaster nitida</i> Wied. 21st June.   |  |

COLEOPTERA. 31. *Hippodamia 13-punctata* (Linné). This coccinellid beetle was not uncommon on the button-bush clumps. Some larvae were observed foraging in the colonies of *Aphis cephalanthi*; imagoes were distributed promiscuously. This and the following Coleoptera, have been determined by Mr. Samuel Henshaw.

32. *Telephorus carolinus* Fabr. This lampyrid beetle lives as a larva among the roots of the button-bush, and in the mat of moss that usually overspreads them; it transforms frequently under the bark of a dead stem, sometimes in the pith cavity of a short and thick stub when low enough to be kept sufficiently moist,

and the imagos are commonly taken on the foliage. The species, being carnivorous, probably has no relation to the button-bush except through its relations with other insects.

Larvae were found among the roots and moss in early spring; pupae were found early in May, and one of these, with the larval skin still enveloping the apex of the abdomen, and serving for certain identification, was bred on the 18th of May. About the same time two teneral imagos were found among the moss enwrapping the roots of a button-bush. I have previously recorded (*Amer. nat.*, vol. 34, p. 371) that fully matured beetles are commonly found eating the nectar flowing from weevil wounds at the base of the flowers of the blue flag.

As the immature stages of this interesting beetle seem not to have been described hitherto, and as it is of somewhat different type from the larvae of other well-known Lampyridae, I deem it worth while to add descriptions herewith of larva and pupa.

**LARVA:**—Length 19 mm., abdomen 11.5 mm., width of head 1.5 mm., of abdomen 3 mm. Body nearly cylindric, dorsum well rounded, widest across the base of the abdomen, and tapering somewhat to both ends. Body segments of nearly equal length, those of the base of the abdomen being slightly shorter and wider, at the sides well rounded, with evident constrictions between the segments.

Coloration obscure; head dark chestnut brown, paler about the base of antennae and mouth-parts. Body olivaceous above, paler below; skin finely granulate and covered with a fine and dense pubescence which gives it a decidedly velvety appearance. Thorax with a pale median longitudinal line, and ( )-marks at the sides of each segment with a large brownish, longitudinally placed, elliptical mark on each side midway between the ( )-marks and the median line. Abdominal segments each with a very narrow, pale, basal, median, longitudinal line or dash, either side of which is a similar oblique, nearly transverse, dash; farther out on the sides of the segments and much farther backward are two broader dashes on either side. These are placed side by side and a sinuous, and continuous, paler longitudinal line extends between them. Farther down upon the sides is a less distinct, similar line in which the spiracles are situated.

Head quadrangular, longer than wide, slightly narrowed just before the hind margin, thinly clad with yellow, spinous hairs. Labral margin squarely truncate, with a low broad quadrangular tooth in the middle, isolated by a minute cleft of the margin either side of it. Mandibles long and strong, regularly arcuate and tapering to a strong point, with a simple strong tooth on the inner border at two thirds their length. Eyes bead-like projections upon the lateral margin at the base of the antennae. Antennae two-jointed spinous, the second joint slightly longer than the first, obliquely truncated at the tip with the longer angle the internal one, and bearing on the end an external flabellum, and a slightly longer, conical rudiment of a third joint which in length about equals the width of the 2d segment. Basal segment of both labium and maxillae lying in one plane and densely covered below with a growth of spinous yellowish hairs. There are abundant hairs also on the ventral side of the mentum of the labium, and on the apical margins of all the remaining segments of both maxillae and labium. The maxillary palpi are 4-jointed, the length of the segments from the base

outward being to each other as 1: 2: .3: 1.2, and their widths being as 1: .8: .6: .4 decreasing to apex, this last segment being conical. The lacinia of the maxilla is oblique at base and straight and conical in its distal three fourths, this part being set off by a constriction on the inner side. The mentum of the labium is trapezoidal, widest in front, where occurs a slight notch on the median line. The basal segment of the labial palpus is cylindric and about as long as the mentum; the 2d segment is a third as long and half as wide at base and tapers to a point.

The legs of the three pairs are alike save for very slight difference in size; femora and tibiae are of equal length coxae one third shorter, trochanters one half shorter, and tarsi two thirds shorter. The tarsus is 1-jointed, including the claw, merely tapering into a straight, and at the last, slightly decurved tip. It is beset about its base by 6-10 stiff appressed spines, while the legs throughout are sparsely clad with yellowish hairs. The 9th segment of the abdomen is one third narrower than the 8th and the 10th is one half the width of the 9th and is short, cylindric, simple.

*Pupa*.:—Length 12 mm., abdomen 8 mm., width of head 2 mm., of abdomen 3 mm. Prothorax placed vertically at the front end of the body, its disc nearly square, with square hind angles and rounded front angles. Head bent under. Antennae essentially as in the adult beetle, but shorter bent in ?-shaped, the upper curve of the ? surrounding the knees of the first and second pairs of legs and lying against the sides of the thorax. The knees of the hind legs project dorsally from under the hind wings, the tarsi of all legs lie near together with soles opposed on the median ventral line. The abdomen is depressed cylindric, at its apex depressed conic, gradually terminating in a pair of straight soft flat spines about as long as the distance between their tips.

The whole surface of the body is smooth. A broad, dark, dorsal band nearly covers the abdomen and there is a line of dashes either side of it. The large spot of the prothorax of the imago appears in the old pupa very distinctly, and also the paler markings about the bases of the antennae and there is a dark blotch upon the metathoracic scutum.

Bred at Lake Forest, Ill., 18th May, 1901.

33. *Macrops porcellus* (Say)? A standing dead stem of button-bush was found to be infested with larvae, and was put in a breeding cage in the spring and this beetle emerged in the cage. Unfortunately, the gummed label on the vial in which I kept the specimen became loosened and was lost, and with it all further data concerning this insect.

NEUROPTERA. 34. *Sisyra umbrata* Needham. While working in a button-bush clump I one day accidentally injured a tree-frog that was sitting, perfectly concealed by its color, on one of the trunks: and having thus made it necessary to kill the frog, I examined its stomach, and there I found for the first time this species. The frog had eaten six of the spongilla flies. By a little careful searching I soon found a few specimens sitting on the button-bushes. I found also the larvae crawling about on little knot-like growths of *Spongilla fragilis* attached to submerged twigs and trunks of the button-bush as well as to other solid supports of any sort. It is therefore a natural, though quite an incidental associate of the button-bush.

35. *Chauliodes rastricornis* Rambur. Larvae of this species are found occasionally under button-bush trunks that are lying in the edge of the water, and I found one pupa that had ensconced itself neatly in the pith cavity of a stub of large size that projected from the open water. This pupa I reared, the imago issuing on the 31st of May.

ACARINA. 36. An undetermined mite of very small size makes a felted gall on the leaves of the most vigorous shoots. The mites live on the under side of the leaf between the veins in the midst of the reddened hypertrophied plant hairs which fill the concavity that quickly develops. Frequently the gall becomes distinctly sacculate, rising to a considerable height from the upper side of the leaf, and becoming almost a mantle gall. It is of irregular shape, with warty surface, and is reddish in color, or green, tinged with reddish.

Besides the foregoing, there were at least four other species of insects that certainly belong to the button-bush population, but which I have been able neither to find out about, nor to name. These are a jassid whose nymphs were common, feeding on the leaves in June, but which I did not breed. A number of jassid imagos might be swept from the foliage in midsummer, but whether they were there by accident was uncertain; an undetermined coleopterous larva that I took to be one of the Oedemeridae which I found repeatedly under the bark of dead stems; and two species of ants undetermined that were taken often about the colonies of APHIS and EULECANIUM.

#### HABITS.

The ecological relations of the members of this assemblage of insects are not without interest. A number live in the dead stems only. Of these, four live in the pith cavities of broken stems: two (nos. 1 and 7) in the dry tops, and two (in the pupal stage only, nos. 32 and 35) in the wet stubs. Five live under the bark, three (nos. 1, 3 and 32) as pupae only, and two (nos. 23 and 33) feeding as well as transforming there; two of these live only in wet stems (nos. 23 and 32). Nine of our list (nos. 4, 5, 24-30) are merely flower visitors. Two feed on the green stems and these (nos. 15 and 16) are among the most important enemies of the button-bush. Ten are leaf feeders (nos. 2, 6, 13, 14, 17-21, and 36, the last being the only gall maker observed) and among these only one (no. 2) seemed of much importance to the plant. Of the three prime depredators, therefore, the moth larva (no. 2) and the scale insect (no. 16) have their internal parasites of the usual sort, and the aphid (no. 15) has its predatory larval dipterous (no. 22) and coleopterous (no. 31) foes. Three aquatic insects of our list (nos. 24, 34, and 35) are

natural associates of the button-bush, requiring similar habitat, but their relations with it are of the most tenuous sort. Among all the insects named only three, and these three, Hemiptera (nos. 14-16), appeared to be getting their living entirely at the expense of the button-bush, and of these three the first was not very common, and the other two were beset by most efficient enemies.

## THE HEMIPTERA DESCRIBED BY PHILIP REESE UHLER. 1.

BY SAMUEL HENSHAW, CAMBRIDGE, MASS.

- 1860 **1** Hemiptera of the North Pacific exploring expedition under Com'rs  
Rodgers and Ringgold. Proc. acad. nat. sci. Phil., 1860, p. 221-231.
- 1861 **2** Homoptera of the North Pacific exploring expedition under Com'rs.  
Rodgers and Ringgold. Proc. acad. nat. sci. Phil., 1861, p. 282-  
284.
- 1861 **3** Descriptions of four species of Hemiptera collected by the North-western  
boundary survey. Proc. acad. nat. sci. Phil., 1861, p. 284-286.
- 1861 **4** Rectification of the paper upon the Hemiptera of the North Pacific  
expedition. Proc. acad. nat. sci. Phil., 1861, p. 286-287.
- 1861 **5** Descriptions of a few new species of Hemiptera, and observations upon  
some already described. Proc. ent. soc. Phil., 1861, vol. 1, p. 21-24.
- 1863 **6** Hemipterological contributions.—No. 1. Proc. ent. soc. Phil., 1863,  
vol. 2, p. 155-162.
- 1863 **7** Hemipterological contributions.—No. 2. Proc. ent. soc. Phil., 1863,  
vol. 2, p. 361-366.
- 1869 **8** Notices of the Hemiptera obtained by the expedition of Prof. James  
Orton in Ecuador and Brazil. Proc. Bost. soc. nat. hist., 1869, vol.  
12, p. 321-327.
- 1870 **9** [*Podisus placidus*.] Amer. ent. and bot., 1870, vol. 2, p. 203.
- 1871 **10** Notices of some Heteroptera in the collection of Dr. T. W. Harris.  
Proc. Bost. soc. nat. hist., 1871, vol. 14, p. 93-109.
- 1871 **11** [Salt water Hemiptera.] Amer. journ. sci., 1871, ser. 3, vol. 1, p.  
105-106.
- 1871 **12** A list of Hemiptera collected in eastern Colorado and northwestern  
New Mexico, by C. Thomas, during the expedition of 1869. Rept.  
U. S. geol. surv. Wyoming, 1871, p. 471-472.